

Wind Energ. Sci. Discuss., referee comment RC1  
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## **Comment on wes-2022-4**

Anonymous Referee #1

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Referee comment on "Gradient-Based Wind Farm Layout Optimization Results Compared with Large-Eddy Simulations" by Jared J. Thomas et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2022-4-RC1>, 2022

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The manuscript presents a rigorous methodology for wind farm layout optimization using simplified engineering models. The main strength of the study is in comparing their model's output against large eddy simulation results. The text is very well written, with the methodology and results presented in a clear and concise manner to aid in reproducibility. The following points could improve the readability of the text.

In section 2.2.3 the author detail that they used only 1 sampling point for velocity calculation during the optimization procedure, and highlight the errors in the 1 point case in Figure 3. Readers would benefit from seeing the impact of this simplification on the optimal results through some test cases where higher sampling points were taken during optimization as well.

In section 2, it may be beneficial for completeness and readability to expand a bit more upon the wake expansion continuation method and the meanings of the associated relaxation factors rather than just mentioning it as a reference.

Figure 12 show significant differences between the BP model and SOWFA, for both the base and optimized results. Earlier in the paper in section 3, the authors showed that their model is able to match reference LES results for the horns rev wind farm with a high degree of accuracy. Could the authors comment on why there are now larger errors when compared to LES for the developed wind farm layout?